GOOCH HILL WEST NEIGHBORHOOD PLAN

SECTION 2: NEIGHBORHOOD ANALYSIS

2.1: Demographic and Housing Data: Current population and housing data can be estimated by reviewing available aerial photography and other sources. Exhibit 1 shows that most of the 994-acre Plan Area is currently vacant. The majority of existing homes are located along the western edge of Gooch Hill Road. The approximate total of 18 dwelling units contains an estimated population of about 40 (using 2.24 persons/d.u. per 2005 Census data).

2.2: Existing Land Use: The major land components of the Plan Area consist of several long-standing private ownerships. These include:

1. Brenden Ranch parcels south of Huffine Lane (between Lynx Lane and the Gallatin County/ Bozeman Area Zoning District) and north of the Elk Lane alignment;
2. Sales Ranch parcels south of the Brenden Ranch to the south Plan boundary, including the Middle Creek Minor Subdivision;
3. The Sales parcel abutting Elk Lane and Cobb Hill Road;
4. Haugen parcels between the zoning district boundary and Gooch Hill Road; and
5. Several smaller parcels along the west side of Gooch Hill Road.

In general, the large parcels have been farmed and smaller parcels have accommodated rural residences and small businesses. Recent development along Huffine Road includes the Ferguson Industrial Park that will adjoin existing business/ light industrial uses.

2.3: Current Land Use policy and Zoning: Per Exhibit 3, the Gallatin County/ Bozeman Area "Future Land Use Plan' describes the east half of Section 17 of the Plan Area as "Moderate Intensity Developments". The northwesterly quarter section of Section 17 and abutting Plan area to the west are within the Gallatin County/ Bozeman Area planning jurisdiction and are shown as "Agricultural/ Rural Residential Transitional Area".

Current zoning is illustrated in Exhibit 4. The zoning pattern varies from "Light Manufacturing" abutting Huffine Lane through Neighborhood Service commercial and Residential Medium Density to Agriculture Suburban in the south half of the zoned area.

2.4 Environmental Characteristics*: Preliminary investigations and research have provided information on the existing environmental characteristics of the GHW Plan Area. This baseline data will be refined by more detailed investigation at the time of future development applications.

2.4.1: Watercourses: The Plan Area contains two significant watercourses along with various agricultural ditches. Middle Creek (also known as Hyalite Creek) is a tributary to the East Gallatin River and runs through the west side of the Area. This creek is planned to be protected and preserved by designating park and/or open space along the stream corridor/ floodplain.

The Farmers Canal runs across the southeast corner of the Area and is used for agricultural purposes. The riparian area associated with Farmers Canal is also planned to be preserved and designated as open space. There are various ditches previously used for agricultural irrigation. All active watercourses will be maintained.

2.4.2: Floodplain: The Federal Emergency Management Agency (FEMA) has published floodplain maps delineating the floodplain associated with the major rivers in the Bozeman area. Although Middle Creek has not been studied by FEMA, there is a potential associated floodplain. Based upon soil maps and aerial photography, the location of the Middle Creek floodplain was approximated and displayed in Exhibit 5.

As mentioned above, the area surrounding Middle Creek is planned to be designated as open space and park area; therefore, any potential flood hazards will be mitigated.

(*Note: This section incorporates material researched and drafted by Hyalite Engineers, PLCC).*

A floodplain study has not been conducted at this time because of the proposed park land designation surrounding Middle Creek. As development progresses, it will be necessary to perform a flood analysis of the creek. Investigation for flooding potential from irrigation ditches will also be reviewed at the time of future development applications.

2.4.3: Wetlands: Four general concentrations of wetlands exist onsite as shown on Exhibit 6. This exhibit displays the wetland and riparian areas as designated by the Gallatin Local Water Quality District as well as background infrared photography to illustrate lush and moist areas. (Note- The large red area in the center of the exhibit is not a wetland, but rather an irrigated field.)

The first two concentrations of wetlands occur along the major watercourses: Middle Creek stream corridor and the Farmer's Canal. The Middle Creek stream corridor is planned to be designated as an open space park area, and as a result, disturbance of wetlands along this corridor will be minimized. No changes to the existing Farmers Canal are proposed.

The third wetlands area is located to the west of Middle Creek on the western edge of the Plan Area. As development extends to this area, the wetlands will either be avoided or properly mitigated. The final area to contain wetlands is near the north Area boundary. These wetlands are located adjacent to Huffine Lane and have been recently delineated on a preliminary plat for a minor subdivision.

Wetlands may also be found along various agricultural ditches located throughout the Plan Area. All wetlands will be delineated and surveyed for an accurate wetland assessment prior to development.

2.4.4: Groundwater Depth and Flow: Groundwater depth and flow direction are factors during the design and determination of degradation effects of a wastewater distribution system. High groundwater could extend the wastewater permitting process and may affect structural aspects of future development.

Exhibit 7 shows the groundwater flow direction to be North 27°33'36" West and the hydraulic gradient to be 0.01345 ft/ft., as well as the approximate groundwater depths within the Plan Area. These depths were determined by the NRCS soil data associated with soil types. NRCS published Table K1 (Water Features) that lists the approximate depths of the groundwater typically found with different soil classifications. Groundwater depths range from one foot to greater than six feet below ground surface. However, the majority of the Area has depths to groundwater greater than six feet. From visual inspection and surrounding development, groundwater does not appear to be a limiting factor. As future development occurs, groundwater depths will be more accurately determined as appropriate.

2.4.5: Soil Types and Limitations: The Natural Resources Conservation Service (NRCS) has documented 12 different soil types (mostly silt loams and loams) within the Plan Area as shown on Exhibit 8. These soil types are distinguished by many different characteristics including physical properties, engineering properties and water features.

As described in this exhibit, a large percentage of the Plan Area is classified as soil type 53B. This soil is defined by the NRCS as Amsterdam Silt Loam and can be described as a deep, well drained soil that is generally located on stream terraces. This soil can have somewhat limited permeability, and this will be considered when a wastewater disposal system is to be installed as part of future development. Preliminary investigation indicates this soil will be suitable for building construction and should not be a limiting factor for typical construction.

2.4.6: Wildlife Habitat: Most of the Area is currently open agricultural land that does not accommodate substantial vegetation to support larger animals such as deer, bear, elk etc. The animals that will be affected more by future development are rodents such as ground squirrels and other small animals.

The proximity of Huffine Lane, which is classified as a principal arterial by the Montana Department of Transportation (MDT), presents a hazard for wildlife. Although the Area

is not critical to the preservation of wildlife habitat or fish population, a natural corridor for wildlife does exist along Middle Creek, which will be protected as permanent open space. No critical or endangered species are known to inhabit the Plan Area.

2.5: Community Effects: This section of the GHW Plan describes potential effects of future development. These effects or impacts include water supply, wastewater treatment, traffic and transportation system, cultural resources, and schools. This background analysis provides the basis for identification of potential mitigation as part of the GHW Plan implementation.

2.5.1: Water: The RAE County Subdivision Water & Sewer District # 313 serves existing developments to the east of the Plan Area. In response to new/ proposed developments (Ferguson Commercial and Falcon Hollow), the District has expanded its service boundaries. These developments will install and construct water infrastructure to the west side of Gooch Hill Road, which can be expanded to serve the Plan Area.

Such improvements increase the capacity of the District sufficient to accommodate the above developments, but not to serve the entire GHW Plan Area at potential buildout. Therefore, future development will require extension of District boundaries and expansion of capacity via construction of new system facilities.

> 2.5.1.1: Existing Water Service Conditions: Currently, the District's water system consists of five water supply wells and a water distribution system which includes 4, 6, and 8- inch water mains. All of the existing wells pump directly into the distribution system, maintaining a minimum system pressure. The total water supply from the existing wells is 565 gallons per minute (gpm). The following table lists the existing water supply wells (well locations are shown on Exhibit 10):

Well	Flow
Laundry	125 gpm
Clubhouse	130 gpm
Subdivision	70 gpm
Meadowbrook	130 gpm
Falcon Hollow	110 gpm
Total Firm Capacity=	565 gpm

There are approximately 277 residences connected to the system at this time, with an additional 56 residences already approved for connection (Meadowbrook Subdivision), bringing the total to 333 connections. The area to be served by the existing public water supply is shown in Exhibit 9.

2.5.1.2: Flows from Known Uses: The current estimated water use for the District is 325 gpm needed for a peak hour. This includes the Meadowbrook Subdivision (which is near build-out) that was approved for connection to the District. As stated above, the total water supply from the existing wells is 565 gpm. The District is capable of servicing the Ferguson Commercial project and Phase I of the Falcon Hollow project, but is not able to handle any significant development beyond that.

2.5.1.3: Demand from Undeveloped Area: The demand from the GHW Plan Area will be determined can only be estimated at this time given the nature of the Land Use Plan. All future development demand will be concurrent with the availability of service from the District. Such development will require coordination and connection with its existing and planned capacities.

The flows generated from the GHW Plan Area will not include property located west of Middle Creek. This area will be served by individual wells, due to the lower elevations, potential for lower density development, and the need to cross Middle Creek with a water main if the District was extended.

2.4.1.4: Future Improvements: The District is currently planning to expand their water system to improve capacity within the District's existing boundaries.

Improvements include the proposed construction of a 500,000-1,000,000 gallon storage reservoir as shown in Exhibit 10. The District is also proposing to upsize some water mains to more efficiently distribute water and increase fire flow capabilities.

Future development in the GHW Plan Area will be dependent upon expansion of the District boundaries, new public water supply wells, and installation of new water mains. The Board of Directors of the District has expressed interest in future system coordination with landowners within the GHW Plan Area as a means of fulfilling their public service mission.

2.5.2. Wastewater Treatment: The RAE Water & Sewer District's treatment plant and wastewater effluent disposal galleries sewer system currently treats the wastewater generated by the developments located on the east side of the Plan Area.

There are recent improvements that have been proposed with the above mentioned developments. The Ferguson Commercial project has planned to install a gravity collection system on their property to convey sewage to a centralized raw-sewage lift station. This lift station would then provide transport of raw sewage back to the District's wastewater treatment plant. This infrastructure was designed to accommodate future growth of the District, including areas within the GHW Plan.

The Plan calls for eventual expansion of the District's sewer service. The limits of the expansion shall be the same as the water service limits; the area west of Middle Creek will be excluded from the District due to lower elevations, lesser densities, and the necessity to cross Middle Creek. The Plan includes a new site for infiltration galleries and increased pump size in the raw sewage lift station to accommodate higher flows.

2.5.2.1: Existing Wastewater Treatment Conditions:

The District's wastewater treatment and disposal system presently consists of a centralized gravity collection system with conveyance to a raw sewage lift station

(located in the King Arthur Trailer Park) that transports wastewater to a newly constructed SBR wastewater treatment plant. Exhibit 10 describes the District's existing facilities.

The current system capacity of the District's wastewater treatment plant is 200,000 gallons per day (gpd) with storm flows up to 250,000 gpd. The existing treatment plant is receiving approximately 140,000 gpd at this time including infiltration and inflow (I&I). The District operator has stated that the District will be working on replacing some manholes, service lines, etc. this year to reduce the amount of I&I into the system which will increase the available treatment capacity for future development.

2.5.2.2: Estimated Future Flows from Known Uses: Three developments within the GHW Plan Area are currently being proposed to be added to the District-Ferguson Commercial, Falcon Hollow, and Vinger Development. The following estimated flows will be generated by these developments:

Project	Average Daily Flow (ADF)
Ferguson Commercial	13,000 gpd
Falcon Hollow	76,800 gpd
Vinger Development	14,300 gpd
Total Estimated ADF =	104,100 gpd

2.5.2.3: Estimated Future Flows in Undeveloped Areas: The wastewater generated from the GHW Plan Area will be dependent on the type of land use, the density of such use and the area of the development. The Plan is based upon incremental development review concurrent with expansion of service capacity to meet new demands.

2.5.2.4: Future System Expansion: Planned sewer improvements have been initiated by the Ferguson Commercial project. It is proposed to install a gravity collection system within the Ferguson project boundaries that can be extended

into the Plan Area to convey sewage to a centralized raw-sewage lift station. The lift station will then transport wastewater directly to the District's treatment and disposal facilities. The proposed sewer mains have been designed to allow connection of future development. The District operator requested that this be investigated to reduce numerous lift stations from future developments and limit the operation and maintenance burden of the District as a whole.
The topography of the site allows for gravity lines throughout the majority of the Plan Area to convey sewage to the lift station installed on the Ferguson Commercial site. The gravity and sewer force mains have been sized to serve the Plan Area.

As the GHW Plan Area develops, it will be necessary to further expand the collection and conveyance capacity of the wastewater treatment system. The existing wastewater treatment plant can be expanded rather easily to treat wastewater; however, the current wastewater effluent disposal system (infiltration galleries) will not be sufficient and there is not enough space to add more galleries at the current location. Accordingly, Exhibit 9 shows the proposed location of the future infiltration galleries to serve GHW development.

2.5.3: Storm Water Management: Storm water runoff will be controlled throughout the construction phases and after the completion of future development in accordance to the regulations in MDEQ 8. During construction, control measures such as silt fences, straw bales, and diversion ditches will be installed as necessary to avoid erosion problems and additional runoff reaching surface waters.

After each construction phase is complete, it will be necessary to control the excess runoff that is generated by the greater percentage of impervious area. A detailed storm drainage plan will be completed for submittal to the MDEQ when the actual development process starts. This plan shall specify erosion control measures such as drainage basins, grading, detention/retention ponds, ditches, seeding plans and anything else that may be necessary for successfully controlling post-development stormwater runoff on the site.

2.5.4: Transportation System: As more development occurs in the Gallatin Valley, the need for a more organized and efficient transportation system becomes critical. The Greater Bozeman Area Transportation Plan (GBATP) is the foundation for transportation and circulation infrastructure improvements planned in the central area of the County. The GHW Plan incorporates the arterial road alignments and other relevant factors because it is adopted County policy. (Please refer to Exhibit 11.)

The following sections discuss the current traffic conditions and the future needs in the area. Topics such as Level of Service, traffic signals, planned improvements and trip generation are discussed. (Please refer to the list of references for traffic data sources.)

2.5.4.1: Existing Conditions and Adjacent Roadways: Huffine Lane bounds the Plan Area on the north. It is a five-lane roadway with two lanes in each direction and a two-way-left-turn-lane (TWLTL), and is classified as a principal arterial by the GBATP. Huffine Lane has a speed limit of 65 miles per hour (MPH) throughout the Area and provides connectivity between areas outside of Bozeman such as Four Corners, Big Sky, Yellowstone National Park and the city of Bozeman.

Based on a 2004 traffic study done by Marvin & Associates (M&A) for the Falcon Hollow Subdivision, Huffine Lane carried 16,500 Average Daily Trips (ADT) west of Gooch Hill Road and 18,000 ADT east of Gooch Hill Road.

The Huffine Lane Corridor Study – Phase 1, and conversations with Rob Buckvich at the Montana Department of Transportation (MDT), indicate that the state will not support any more approaches than what is defined in the above mentioned study. Currently there are 10 moveable legal approaches on the south side of Huffine Lane between Love Lane and Gooch Hill Road. An approach directly across from Love Lane on the south side of Huffine Lane will be supported by the MDT. Some of the alternatives described below in Section 2.4.4.3 actually support the removal of existing approaches to allow for smoother

traffic flow on Huffine Lane. (Please refer to Section 2.4.4.3 below for more information regarding the alternative analysis done on Huffine Lane.)

Gooch Hill Road bounds the Plan Area on the east-- a two-lane roadway classified as a minor arterial by GBATP. Gooch Hill Road is primarily used for residential and agricultural access. The intersection of Gooch Hill Road and Huffine Lane is controlled with stop signs located on the northbound and southbound approaches.

Based on the same 2004 M&A reference report, Gooch Hill Road had an ADT of 3500 vehicles per day (vpd) south of Huffine Lane and less than 100 vpd north of Huffine Lane. In 2001, M&A completed a different traffic study for the Meadowbrook Estates Subdivision where they investigated the intersection of Gooch Hill Road and Huffine Lane. They investigated this intersection again in 2004 when they completed the study for Falcon Hollow Subdivision. The most notable change between the two studies was the significant increase in left turns (to the west) from Gooch Hill onto Huffine Lane. This reflects significant development in the Four Corners area, and beyond.
Level of Service (LOS) is used as a way to classify the operational conditions of an intersection. LOS ranges from "A" to "F"; "A" being optimal conditions and "F" being failure of the system. Overall, a LOS of "D" is considered acceptable intersection conditions. It was determined in the M&A 2004 study that the intersection of Huffine Lane and Gooch Hill Road has an LOS of "D" in the morning peak hour and "F" in the evening peak hour.

Love Lane intersects Huffine Lane to the north of the Plan Area, but within the proposed east/west boundaries. As a two- lane roadway, it is classified as a principal arterial by the GBATP and serves residential, agricultural, and commercial uses north of Huffine Lane.

Stucky Road is a two lane roadway classified as a principal arterial by GBATP. It is currently unpaved and only exists from Gooch Hill Road to South 19th Avenue.

The Huffine Lane Corridor Study by the MDT specified the factored ADT on Huffine Lane cross-streets as displayed in the following table:

Location	Date of Count	MDT Monthly Factor	Factored Volume (vpd)
Gooch Hill Rd S. of Huffine	Monday, 4/05/04	0.98	3,133
Huffine W. of Gooch Hill Rd	Wednesday, 4/07/04	0.98	18,641
Love Lane N. of Huffine	Monday, 4/05/04	0.98	713
Lynx Lane S. of Huffine	Monday, 4/05/04	0.98	413
Huffine W. of Lynx Lane	Wednesday, 4/07/04	0.98	18,408

The following table illustrates the Level of Service (LOS) of four intersections within (or just outside) the Plan Area along the Huffine Lane corridor. This table was defined by the Huffine Lane Corridor Study in 2005 and the existing LOS values are an average taken of the morning, noon, and evening peak hours and all the turning lanes.

Location	Existing LOS	Future LOS (2025)
Cobb Hill Road	A	F
Lynx Lane	A	F
Love Lane	A	B (signal)

If signals or intersections improvements are not implemented before the year 2025, intersection failure is predicted.

2.5.4.2: Traffic Generation: Estimation of potential impacts related to future development will be dependent on actual development. Trips generated by proposed subdivision will be estimated using factors identified in *Trip Generation, 7th Edition* as published by the Institute of Transportation Engineers.

2.5.4.3: Proposed Future Developments: As the responsible public agency, the Montana Department of Transportation (MDOT) plans to add more traffic signals along the Huffine Lane corridor. They have determined the criteria for half-mile spacing between traffic signals to maintain a steady traffic flow. With the following anticipated additional signals at the following intersections, travel speeds will decrease to 35-45 mph along the Huffine Lane corridor with the expectation of improved traffic safety: Cobb Hill Road, Love Lane, Gooch Hill Road and Fowler Lane.

If signals become required every quarter mile, it may be necessary to implement one-way traffic lanes to keep traffic progression efficient.

Phase 2 Technical Report of the Huffine Lane Corridor Study by the Montana Department of Transportation describes three alternatives for improvements in the Huffine Lane Corridor:

Alternative 1: Enhanced TWLTL: A Two Way Left Turn Lane (TWLTL) currently exists on Huffine Lane, but this alternative includes adding a raised median at key intersections, adding right-turn deceleration and acceleration lanes, possibly consolidating existing accesses onto Huffine Lane, and limiting new access points. This alternative is the worst for safety concerns but the most effective for property access and snow removal.

Alternative 2: Raised Median, Full Turning Movements Allowed Every Half Mile, Directional Turning Movements Allowed at Quarter Mile: This alternative implements a raised median with traffic signals at half mile minimum spacing. Un-signalized turning movements will be allowed every quarter mile. Alternative #2 will allow right turn only accesses onto Huffine Lane, but if a property has alternative access to the corridor, the alternative will be implemented instead of direct access. This alternative falls in the middle as far as safety concerns and

efficient property access. It is an inefficient alternative for snow removal procedures.

Alternative 3: Raised Median, Full Turning Movements Allowed Every Half Mile, Only Right-Ins and Right-Outs Allowed at Intervening Intersections; This alternative implements a raised median with traffic signals at ½ mile minimum spacing. Alternative 3 will allow right turn only accesses onto Huffine Lane, but if a property has alternative access to the corridor, the alternative will be implemented instead of direct access. This alternative is superior from a safety standpoint, but property access and snow removal efficiency are poor.

If Alternative 2 or 3 were adopted, this would mean fewer approaches directly onto Huffine Lane, possibly eliminating some existing driveways and business approaches.

Love Lane: The GBATP 2001 Update specifies a future need for Love Lane to be extended to the south to eventually merge into Gooch Hill Road. If this improvement is implemented, it would create a four-way intersection with Huffine Lane and eventually a four-way intersection with Stucky Road (see below for Stucky Road future improvements). The intersection of Love Lane and Stucky Road would be within the GHW plan boundary.

The following improvements were specified by Manjunathan Kumar, E.I., in the Gallatin County Transportation Infrastructure Assessment and Recommendations Report:

Cottonwood Road: Pavement improvements are planned on Cottonwood Road from Huffine Lane to South 19th Avenue. It is anticipated that the north/south section of Cottonwood Road will be converted to a three-lane urban arterial from Stucky Road to Valley Center Road.

Stucky Road: The 2.5 mile stretch of Stucky Road that is currently gravel is planned for paving within the FY 2006. The GBATP specifies the future need for

Stucky Road to be extended to the west to connect with Elk Lane and Cobb Hill Road. It is planned to intersect Love Lane within the Plan Area boundaries.

Cobb Hill Road: Cobb Hill Road paving and widening is planned for the one mile section from Beatty Road to Gallatin Road during summer 2006.

Beatty Road: The bridge on Beatty Road is in poor condition, does not meet fire truck requirements, and is scheduled to be repaired in FY 2006.

Gooch Hill Road: Gooch Hill Road will be widened from Huffine Lane to Chapman Road. If Love Lane is improved in accordance with the GBATP, there is a potential for a new intersection of Love Lane and Gooch Hill Road south of the GHW Area.

2.5.4.4: Plan Improvements: A significant aspect of the GHW Plan is the connection of Stucky Road to Elk Lane and the extension of Love Lane south to connect with Stucky Road. This infrastructure improvement will not only provide access to the Plan Area, but will provide another travel route from Bozeman to Four Corners taking some traffic off Huffine Lane. Initial investigation shows this improvement to be feasible and desirable.

The GBATP shows the extension of Stucky Road and Love Lane as a future need. (Exhibit 11 describes proposed improvements as defined in the above mentioned plan.) The plan recognizes the need for a more efficient transportation system on the west side of Bozeman due to the high rate of development in the area. The GHW Plan incorporates these future improvements to reflect adopted County transportation policy.

In order to extend Stucky Road, it will be necessary to obtain easements from property owners that will be affected by this improvement. Possible alternative alignments are shown on Exhibit 11A.

2.5.5: Parks/Trails and Open Space: There are currently no trails in the Plan Area. However, the definition and provision of a major open space/ trails is a major strategy of the Plan. As defined in Section 3.1.1, the Plan preserves and protects the Middle Creek floodplain as passive open space and wildlife habitat. It also calls for the dedication and improvement of a large community park to be centrally located and accessible throughout the Area via a trail system.

2.5.6: Historical/Cultural Resources: Scott Carpenter, InteResources Planning, Inc., has compiled an historical background study for the Plan Area. The study found one recorded historical site called the Byron Plum Homestead, previously located along the eastern portion of the Huffine Lane frontage. The study concluded there is potential for more undocumented cultural resources within the Plan Area, which could be investigated by a Level I Cultural Resources Inventory prior to future development. (The complete report is available in Section 7.)

2.5.7: Schools: The GHW Plan Area contains two different elementary school districts- Bozeman Elementary District and Monforton Elementary School District. The boundary between the two lies between Sections 17 and 18 and between Sections 19 and 20. (Please refer to Exhibit 1 for section labeling.) The Bozeman High school District includes the entire Area.

2.5.8: Housing Resources: Within the context of Gallatin County or the Gallatin Valley, the Plan Area is not a significant provider of housing resources. Most existing homes are single-family detached residences on parcels larger than one acre.